Capillary Pressure - Petrophysics Consultant & Training in Australia

Since pore throat size controls saturation and permeability it would seem logical to use saturation or saturation related parameters to predict permeability. This does not happen in most geological models or even most petrophysical models. Instead we aquire NMR logs, core analysis flow zones and rock types in attempts to use porosity to address permeability variations whilst ignoring what we already have for a cheaper, more powerful prediction of permeability. Hydrocarbon pore volume provides a superior default prediction of intergranular rock permeability across different reservoir types and different rock types than porosity, certainly and even saturation. The fluid zones evaluation should be done first to ensure Sw ~ Swi. Every petrophysicist knows that good rock contains more hydrocarbon than poor rock at the same capillary pressure (height), but fails to use it!

Capillary Pressure Mercury Injection Data (MCIP) for Saturation Height?

In addition mercury data generally cannot be used for Sw-Height in a clayey, low permeability rocks unless Cation Exchange Capacity and Clay Bound Water corrections have been made. During a mercury experiment a water phase is not present to wet the clays and fine pores and the mercury bulldozer will physically barge its way through delicate clay lined throats, so, unlike air-brine data, mercury saturations do not provide an analogue for these reservoir saturations. Mercury data provides pore throat size information for rock typing. This lack of a water phase is especially important here where Clay + Capillary Bound Water is a significant fraction of total porosity, as implied here by the 100% + difference between the air-brine and mercury data calculated HPV for the same reservoir height. Hence, despite the need for a resistivity independent bulk volume hydrocarbon these mercury data have limited ability to supply a usefully accurate dm-m scale whole rock storage capacity in rocks below about 30mD or high CEC freshwater shaly reservoirs. However, using MCIP data uncorrected for clay and capillary bound water provides high HPV which is perhaps a more realistic explanation for its continued use.

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